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CLAIMS

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1. An intrinsically safe circuit for use in a hazardous environment, the circuit comprising: a plurality of circuit sectors which are substantially isolated physically from one another by electrical insulating means, and are electrically connected, directly or indirectly, so as to define at least one power transfer path between each said circuit sector and at least one other said circuit sector; and power limiting means provided in the or each said power transfer path between at least two said connected circuit sectors for limiting the maximum power transfer value therebetween to a value less than a predetermined threshold value at which combustion in said hazardous environment is initiated.

2. An intrinsically safe circuit according to claim 1, wherein the circuit includes power limiting means provided in each said power transfer path between circuit sectors for limiting the maximum power transfer values between adjacent circuit sectors to values less than a predetermined threshold value at which combustion in said hazardous environment is initiated.

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3. An intrinsically safe circuit according to claim 1, wherein said electrical isolating means physically separating the circuit sectors comprises air.

4. An intrinsically safe circuit according to claim 1, wherein said electrical isolating means physically separating the circuit sectors comprises an encapsulating material.

5. An intrinsically safe circuit according to claim 1, wherein said power limiting means comprises at least one current limiting elements.

6. An intrinsically safe circuit according to claim 5, wherein the or each said current limiting element comprises resistor means.

7. An intrinsically safe circuit according to claim 6, wherein at least one current-limiting resistor is provided in each said power transfer path in the intrinsically safe circuit, said resistors being provided in series with the circuit sectors.

8. An intrinsically safe circuit according to claim 1, wherein said power limiting means preferably comprises at least one opto-coupler device.

9. An intrinsically safe circuit according to claim 1, further including power supply means for connection to at least one of said power transfer paths so as to define an electrical path between the power supply means and each said circuit sector powered thereby, and wherein at least one power limiting means is provided in the electrical path between the power supply means and each said circuit sector powered thereby.

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10. A method of limiting power transfer in an intrinsically safe circuit for use in a hazardous environment, comprising providing a plurality of circuit sectors which are substantially isolated physically from one another by electrical insulating means, electrically connecting said circuit sectors, directly or indirectly, so as to define at least one power transfer path between each said circuit sector and at least one other said circuit sector; supplying power to each said sector, directly or indirectly; and providing power

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limiting means in the or each said power transfer path between at least two said connected circuit sectors so as to limit the maximum power transfer value therebetween to less than a predetermined threshold value at which combustion in said hazardous environment is initiated.

11. A method according to claim 10, including providing power limiting means in each said power transfer path so as to limit the maximum power transfer values between adjacent circuit sectors to values less than a predetermined threshold value at which combustion in said hazardous environment is initiated.

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12. An intrinsically safe circuit for use in a hazardous environment, the circuit comprising: a plurality of circuit sectors which are substantially isolated physically from one another by electrical insulating means, the circuit sectors being electrically connected, directly or indirectly, so as to define at least one power transfer path between each said circuit sector and at least one other said circuit sector, and wherein at least two said circuit sectors having at least one power transfer path defined therebetween have different sparking voltages; and voltage clamping means associated with each said power transfer path between two said circuit sectors having different sparking voltages, for reducing the maximum voltage which may be applied by one of said two circuit sectors to the other of said two circuit sectors.

13. An intrinsically safe circuit according to claim 12, wherein said voltage clamping means comprises diode means.

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14. An intrinsically safe circuit according to claim 12, wherein the different sparking voltages of said at least two

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circuit sectors having at least one power transfer path defined therebetween are of the same polarity and voltage clamping means comprising at least one zener diode is provided for clamping the voltage in the power transfer path therebetween at a level which is less than the higher of the two circuit sector sparking voltages.

15. An intrinsically safe circuit according to claim 12, wherein the different sparking voltages of said at least two circuit sectors having at least one power transfer path defined therebetween are of opposite polarity and voltage clamping means comprising at least one diode is provided for clamping the voltage in the power transfer path therebetween at a level which is between the two circuit sector sparking voltages.

16. A method of controlling voltages in an intrinsically safe circuit for use in a hazardous environment, comprising: providing a plurality of circuit sectors which are substantially isolated physically from one another by electrical insulating means; electrically connecting the circuit sectors, directly or indirectly, so as to define at least one power transfer path between each said circuit sector and at least one other said circuit sector; supplying power to each said sector, directly or indirectly, so that at least two said circuit sectors having at least one power transfer path defined therebetween are provided with different sparking voltages; and providing voltage clamping means associated with each said power transfer path between two said circuit sectors having different sparking voltages, for reducing the maximum voltage which may be applied by one of said two circuit sectors to the other of said two circuit sectors.

17. An intrinsically safe circuit for use in a hazardous environment, the circuit comprising: a plurality of circuit sectors which are substantially isolated physically from one another by electrical insulating means, and are electrically connected, directly or indirectly, so as to define at least one power transfer path between each said circuit sector and at least one other said circuit sector, and wherein at least two said circuit sectors having at least one power transfer path defined therebetween have different sparking voltages; power limiting means disposed in the or each said power transfer path between at least two said connected circuit sectors for limiting the maximum power transfer value therebetween to a value less than a predetermined threshold value at which combustion in said hazardous environment is initiated; and voltage clamping means associated with each said power transfer path between two said circuit sectors having different sparking voltages, for reducing the maximum voltage which may be applied by one of said two circuit sectors to the other of said two circuit sectors.

18. An intrinsically safe circuit according to claim 1 or claim 12, wherein there is used a limited number of connecting wires between each two circuit sectors connected by at least one power transfer path.

7 ~~19~~. An intrinsically safe circuit according to claim 6 ~~18~~, wherein the number of connecting wires is no greater than four between at least one pair of said connected circuit sectors.

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20. A personal computer (PC) incorporating an intrinsically safe circuit according to claim 1 or claim 12.

21. A data collector circuit consisting of an intrinsically safe circuit according to claim 1 or claim 12.

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